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PERFORMANCE OF STUDENTS IN ALGEBRA ACROSS COLLEGES AT THE NAVAL STATE UNIVERSITY

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ABSTRACT

There had been many studies conducted about algebra across colleges and its implication on the student's academic performance. However, results vary in different research findings and surveys evidently attest to the veracity of students' poor performance and low achievements in most entrance examinations in the national, regional, and local levels. Mathematics, constituting a high percentage against other subjects, is one of the major components of the examinations. The students are given different topics under mathematics to give an assessment prior to their knowledge and comprehension on the subject. The given topics are as follows: Sets and Operation, Real Numbers, Algebraic Expressions, Fractions, Special Products and Factoring, Radicals and Exponents, Linear Equations, Quadratic Equations, and Inequalities and Equations.

The study utilized the descriptive research approach. Different achievement test was distributed to 250 students and interpreted the results. There are no significance difference in the level of performance in the overall scores in algebra among students across

KEYWORDS: performance, algebra, achievement in mathematics.

INTRODUCTION

Mathematics has always been a core foundation in our lives. It has been involved in almost every aspect of everyday living be it on affairs in commerce, livelihood, or as a prerequisite for higher postgraduate studies. It is a living and ever-growing subject that leads the students to a better understanding of the basic concepts and structure of future advanced studies. Such importance can be negligibly appreciated by the youths today as they are becoming enveloped with different trends in life. Naval State University (NSU), gives these students the avenue to enhance their knowledge on the subject. However, despite being integrated into the school's curriculum, the students' lack of interest would implicate their performance on the subject and would eventually lead to more negative results. Evaluating the students' performance on mathematics will yield assessments on their studies and come up with appropriate solutions.

Mathematics consists of thinking about concepts rather than mere memorization of mathematical facts and principles that one should develop in school the attitude of inquiry. It is essential that the students be certain chance to develop, and discover the principles from a series of examples or by another method. For each process, the students were capable to practice it and why he uses it. Paja pointed out that it is a symbolic language that empowers human beings to ponder, record, and communicate ideas concerning the elements of the relationship of quantities. It is taught for instantaneous practical needs, future practical needs, aesthetic needs, and for resourcefulness. A student who creates a way to solve a problem in mathematics enjoys his work. Although Katz agreed that the purpose of measuring achievement is to expand education, he argued that academic achievement results or performance are not very supportive in descriptive analysis, since there are also intermediate purposes which can be segregated such as placement, diagnosis, assessment, prediction and identification. Sorenson asserted that academic achievement could be used to make students work as a basis for decisive his work, and as a means of serving him establish what he knows and what he does not know. She recommended that educators should give greater attention to the roles of attitudes and proper inspiration. Research findings have shown that as adolescence progresses many students adopt negative

attitudes about their mathematical ability and about the usefulness of the subject. Several researchers have reasoned that girls more than boys are prone to this problem.

According to Tugade, the student's performance in the different areas can best be determined by how much they have learned or have not learned that performance can best be measured at all. In assessing the student's performance, teacher-made tests are oftentimes used to determine the extent to which educational objectives have been attained. Among the reasons why there is a need to evaluate the student's performance are (1) to empower teacher instructional objectives in terms of desired learning outcomes, (2) to pre-mass the learner's needs, (3) to deliver relevant instruction and, (4) to calculate the intended outcomes. Although Katz agreed that the purpose of measuring achievement is to expand instruction, he argued that academic achievement results or performance are not very helpful in descriptive analysis, since there are also intermediate purposes which can be differentiated such as placement, diagnosis, assessment, prediction and identification. Katz further explained that tests results are used as one vital part of student's self-concept along with their goals, needs, motivation, the manner they approach various situations, their relationships with people, reactions to frustrations, influences of key figures, events in life which have had a forceful impact and many other factors. Tests may also be used to identify the weaknesses in the student's background experiences. As individuals, they may show that the need to correct weaknesses is a special talent they can capitalize on as enunciated by Powell, the single predictor of success in school seems to be the students' record of academic achievement in the previous grade. This means that a student who was good in the preceding years will also perform better in the succeeding years. On the other hand, Agcoili mentioned high intelligence as predictor of success in schoolwork. A student who is intelligent is likely to succeed in his school endeavors as against a student who is inferior in intelligence. This statement pointed to intelligence as a factor in predicting high performance among students.

In the school, teachers are wondering why college students seem to be attaining low in almost all of the subject areas, especially in Mathematics. They would count that their very low achievement could be attributed to their subjective capabilities, background, characteristics and motivation in schooling. The researcher, who is also a Mathematics teacher in the said institution, has similar observations. As to the categories of students, there are those slow learners and fast learners. Based on observation, Mathematics as a subject has been regarded difficult and often-slow learners have poor performance in Mathematics compared to those intelligent and bright students who would easily comprehend the process on solving problems.

In effect, the research findings and surveys evidently attest to the veracity of students" poor performance and low achievement6s in most entrance examinations in the national, regional, and local levels where Mathematics, constituting a high percentage against other subjects, is one of the major components of the examinations. Results of the 1993 National College Entrance Examination conducted by the Department of Education, Culture, and sports (DECS) to the different secondary schools revealed that, in the NSU alone, out of 272 student examinees only 69 passed, which is roughly only 25 per cent – way behind the national passing percentage of 50 per cent.

The situation above prompted the researcher to look into the personal capabilities, personality and motivation of performing students in Algebra across Colleges of the Naval Institute of Technology in order to determine which factors could be related to performance in the subject area.

THEORETICAL FRAMEWORK

The study anchors on the social learning theories support us to comprehend how people acquire in social contexts (learn from each other) and informs us on how we, as teachers, construct active learning communities. Lev Vygotsky (1962), a Russian teacher and psychologist, first stated that we study through our interactions and communications with others as a result, instructional strategies that encourage literacy across the curriculum play a significant role in familiarity construction as well as the combination of whole class leadership, individual and group coaching, and independent learning. Moreover, teachers need to provide the opportunity to students for a managed discussion about their learning. Discussion that has a determination with substantive comments that build off each other and there is a meaningful discussion between students that results in questions that stimulate deeper thoughtful. Discussion-based classroom using **Socratic dialogue** where the instructor manages the discourse can lead each student to feel like their contributions are valued resulting in increased student motivation. We learn through this cultural lens by interacting with others and following the rules, skills, and abilities shaped by our culture.

METHODOLOGY

This study was conducted in Naval State University (NSU), it is the umbrella of five (5) colleges namely: College of Information and Communication Technology (CIICT), College of Education (CoEd), College of Engineering (COE), College of Maritime Education (COME), and College of Arts and Sciences (CAS). The study was descriptive in nature. Survey method was used for data collection. The descriptive design identified the profile of the students. The chi-square was used to determine the interrelationships between the differences in the level of performance in algebra among the students across colleges?

Participants were 250 college students. The survey questionnaire was distributed among the students. Name, sex, family size, family monthly income, parent's highest education attained, high school average and performance in Algebra of different sets. These questions are to be rated depending on the students' assessment on the matter. The survey is based on a 5-point Likert scale that ranges from Very Poor (1) to Very high (5). Data was described and analyzed using frequency, percentage, weighted mean and Chi-square was employed.

RESULTS AND DISCUSSION

Table 1. Results of the Achievement Test in Sets and Operations

Set 1 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	14	28	9	18	1	2	2	4	20	40	**46**	**18.4**
4	18	36	16	32	2	4	15	30	10	20	**61**	**24.4**
3	14	28	9	18	23	46	15	30	9	18	**70**	**28.0**
2	3	6	9	18	19	38	8	16	9	18	**48**	**19.2**
1	1	2	5	10	2	4	10	20	1	2	**19**	**7.6**
0			2	4					1	2	**6**	**2.4**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**3.82**		**3.18**		**2.44**		**2.82**		**3.72**		**3.20**	

Sets and operations, more than one-fourth (28%) of the students obtained valid score of 3. Only few (2.4%) got valid score of 0. Looking at the mean scores by college, CIICT students led with a mean score of 3.82. This was followed by CoEd (mean = 3.72), CoE (mean = 3.18), CAS (mean=2.82), and CoME (mean=2.44). The findings indicate that CIICT, CoEd and CoE students had high performance while CAS and CoME students had moderate performance in (sets and related sets, operation on sets and Venn diagram.)

Table 2. Results of the Achievement Test in Real Numbers

Set 2 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	1	2	7	14							**8**	**3.2**
4	5	10	12	24			14	28	7	14	**38**	**15.2**
3	15	30	11	22	9	18	9	18	12	24	**56**	**22.4**
2	15	30	15	30	25	50	10	20	14	28	**79**	**31.6**
1	13	26	3	6	13	26	9	18	15	30	**53**	**21.2**
0	1	2	2	4	3	6	8	16	2	4	**16**	**6.4**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**2.26**		**2.98**		**1.80**		**2.24**		**2.14**		**2.28**	

Real numbers, (31.6%) of the students obtained valid score of 2. Only some (3.2%) got valid score of 5. Looking at the ranking of the mean scores by college, CoE students topped with a mean score of 2.98. This was followed by CIICT (mean = 2.26), CAS (mean= 2.24), CoE (mean=2.14), and CoME (mean=1.80). It is expected that CoE, CoEd, CIICT and CAS students had a moderate performance, while CoME students had low performance in (state the

properties and fundamental laws of real numbers, draw a real number line by Cartesian, define prime and composite numbers, differentiate rational and irrational numbers, apply the four fundamentals operations in algebra and simply the sign of grouping.

Table 3. Results of the Achievement Test in Algebraic Expressions

Set 3 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	4	8	2	4	1	2	3	6	1	2	**11**	**4.4**
4	4	8	21	42	2	4	13	26	4	8	**44**	**17.6**
3	10	20	10	20	11	22	8	16	19	38	**58**	**23.2**
2	19	38	11	22	6	12	9	18	15	30	**60**	**24**
1	12	24	4	8	27	54	11	22	9	18	**63**	**25.2**
0	1	2	2	4	3	6	6	12	2	4	**14**	**5.6**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**2.32**		**3.00**		**1.70**		**2.40**		**2.34**		**2.35**	

Algebraic Expression, more than one-fourth, (25.2%) of the students perceived valid score of 1. Only few (4.42%) got valid score of 5. Looking at the ranking of the mean scores by college, CoE students topped with a mean score of 3.00. This was followed by CAS (mean = 2.40), CoEd (mean= 2.34), CIICT (mean=2.32), and CoME (mean=1.70). All colleges had moderate performance except CoME students had a low performance in (constant and variables, algebraic expressions, monomial term, degree of a term/degree of polynomial, addition and subtraction of algebraic expression, multiplication and division of algebraic expression and synthetic division.)

Table 4. Results of the Achievement Test in Fractions

Set 4 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	1	2	2	4	0	0	0	0	1	2	**4**	**1.6**
4	1	2	2	4	0	0	4	8	4	8	**11**	**4.4**
3	6	12	13	26	9	18	23	46	11	22	**62**	**24.8**
2	19	38	15	30	24	48	9	18	12	24	**79**	**31.6**
1	19	38	15	30	13	26	9	18	18	36	**74**	**29.6**
0	4	8	3	6	4	8	5	10	4	8	**20**	**8**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**1.68**		**2.04**		**1.76**		**2.24**		**1.92**		**1.93**	

Fractions (31.6%) of the students alleged valid score of 2. Only some (1.6%) got valid score of 5. Looking at the ranking of the mean scores by college, CAS students topped with a mean score of 3.00. This was followed by CAS (mean = 2.40), CoEd (mean= 2.34), CIICT (mean=2.32), and CoME (mean=1.70). All colleges had moderate performance except CoME students had a low performance in (constant and variables, algebraic expressions, monomial term, degree of a term/degree of polynomial, addition and subtraction of algebraic expression, multiplication and division of algebraic expression and synthetic division.)

Table 5. Results of the Achievement Test in Special Products and Factoring

Set 5 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	1	2	3	6	0	0	1	2	3	6	**8**	**3.2**
4	11	22	21	42	4	8	10	20	6	12	**52**	**20.8**
3	24	48	11	22	17	34	12	24	15	30	**79**	**31.6**
2	7	14	13	26	6	12	18	36	17	34	**61**	**24.4**

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1	7	14	0	0	21	42	7	14	7	14	**42**	**16.8**
0	0	0	2	4	2	4	2	4	2	4	**8**	**3.2**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**2.84**		**3.16**		**2.00**		**2.48**		**2.50**		**2.60**	

Special products and factoring, where (31.6%) of the students perceived valid score of 3. Only few (3.2%) got valid score of 5 and 0. Looking at the ranking of the mean scores by college, COE students led with a mean score of 3.16. This was followed by CIICT (mean = 2.84), CoEd (mean= 2.50), CAS (mean=2.48), and CoME (mean=2.00). This finding indicates that CoE performed high, while the other colleges had low performance in (product of a monomial and polynomial, product of sum and difference of two terms, square binomial, cube of binomial, square of trinomial, binomial theorem, properties of expansion by Pascal's triangle, common factor, difference of two squares, perfect square trinomial, factoring by trinomial/polynomial by trial and error, factoring by grouping, and sum and difference of two squares).

Table 6. Results of the Achievement Test in Radicals and Exponents

Set 6 Scores	**COLLEGE**										**TOTAL**	
	CIICT		**CoE**		**CoME**		**CAS**		**CoEd**			
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
5	0	0	0	0	0	0	0	0	1	2	**1**	**.004**
4	7	14	3	6	0	0	0	0	3	6	**13**	**5.2**
3	8	16	13	26	7	14	2	4	5	10	**35**	**14**
2	14	28	11	22	22	44	14	28	18	36	**79**	**31.6**
1	16	32	23	46	21	42	20	40	20	40	**100**	**40**
0	5	10	0	0	0	0	14	28	3	6	**22**	**8.8**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**1.92**		**1.92**		**1.72**		**1.08**		**1.76**		**1.68**	

Radicals and exponents, nearly half (40%) of the students obtained valid score of 1. Only few (.004%) got valid score of 5. Looking at the ranking of the mean scores by college, CIICT and COE students led with a mean score of 1.92. This was followed by CoEd (mean = 1.76), CoME (mean=1.72), and CAS (mean=1.08). This finding means that all colleges had low performance in (positive integral exponent/zero exponent, negative integral exponent, roots and radicals, properties of radicals, rational exponents, simplification of radicals, operations of radicals, reduction of index, rationalization of denominator, exponential and logarithmic function, inverse function, and cha\nge of base).

Table 7. Results of the Achievement Test in Linear Equations

Set 7 Scores	**COLLEGE**										**TOTAL**	
	CIICT		**CoE**		**CoME**		**CAS**		**CoEd**			
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**F**	**%**	**f**	**%**
5	1	2	3	6	0	0	0	0	0	0	**4**	**1.6**
4	2	4	5	10	4	8	0	0	2	4	**13**	**5.2**
3	14	28	23	46	20	40	12	24	3	6	**72**	**28.8**
2	22	44	7	14	19	38	11	22	20	40	**79**	**31.6**
1	10	20	11	22	7	14	13	26	17	34	**58**	**23.2**
0	1	2	1	2	0	0	14	28	8	16	**24**	**9.6**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**2.18**		**2.58**		**2.42**		**1.42**		**1.48**		**2.02**	

Linear equations, (31.6%) of the students perceived valid score of 2. Only some (1.6%) got valid score of 5. Looking at the ranking of the mean scores by college, COE students led with a mean score of 2.58. This was followed by CoME (mean = 2.42), CIICT (mean=2.18), CoEd (mean = 1.48 and CAS (mean=1.42). This finding means that CoE, CoME and CoT colleges had moderate performance while CoEd and CAS had low performance in (conditional equation and identities, operations on equations, linear equations in one variables, linear equations in two variables, linear equations

in three variables, solution by graphical method, algebraic method and determinant method, ratio and proportion, and variation).

Table 8. Results of the Achievement Test in Quadratic Equations

Set 8 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	2	4	2	4	1	2	0	0	0	0	**5**	**2**
4	0	0	12	24	7	14	1	2	4	8	**24**	**9.6**
3	21	42	12	24	9	18	7	14	8	16	**57**	**22.8**
2	15	30	16	32	19	38	13	26	18	36	**81**	**32.4**
1	8	16	3	6	10	20	17	34	10	20	**48**	**19.2**
0	4	8	5	10	4	8	12	24	10	20	**35**	**14**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**2.22**		**2.58**		**2.16**		**1.36**		**1.72**		**2.01**	

Quadratic equations, (32%) of the students obtained valid score of 2. Only few (.2%) got valid score of 5. Looking at the ranking of the mean scores by college, COE students led with a mean score of 2.58. This was followed by CIICT (mean = 2.22), CoME (mean=2.16), CoEd (mean = 1.72) and CAS (mean=1.36). This finding means that all colleges had low performance in (positive integral exponent/zero exponent, negative integral exponent, roots and radicals, properties of radicals, rational exponents, simplification of radicals, operations of radicals, reduction of index, rationalization of denominator, exponential and logarithmic function, inverse function, and cha\nge of base).

Table 9. Results of the Achievement Test in Inequalities and Equations

Set 9 Scores	COLLEGE										TOTAL	
	CIICT		CoE		CoME		CAS		CoEd			
	f	%	f	%	f	%	f	%	f	%	f	%
5	0	0	0	0	2	4	2	4	0	0	**4**	**1.6**
4	10	20	4	8	3	6	4	8	3	6	**24**	**9.6**
3	19	38	21	42	4	8	10	20	7	14	**61**	**24.4**
2	17	34	18	36	26	52	15	30	20	40	**96**	**38.4**
1	4	8	4	8	10	20	15	30	14	28	**47**	**18.8**
0	0	0	3	3	5	10	4	8	6	12	**18**	**7.2**
TOTAL	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**50**	**100.0**	**250**	**100.0**
Mean	**2.70**		**2.38**		**1.92**		**2.02**		**1.74**		**2.15**	

Inequalities and equations, more than one-fourth (38.4%) of the students obtained valid score of 3. Only few (1.6%) got valid score of 5. Looking at the ranking of the mean scores by college, CIICT students led with a mean score of 2.70. This was followed by CoE (mean = 2.38), CAS (mean=2.02), CoME (mean = 1.92) and CoEd (mean=1.74). This finding means that Cot, CoE and CAS colleges had moderate performance while the CoME and CoEd colleges had low performance in (inequalities, properties of inequalities, solution sets, and quadratic inequalities, fractional).

Table 10. Difference in Performance in the Overall Scores in Algebra of the Respondents Across Colleges

Valid Scores	CIICT	CoE	CoME	CAS	CoEd	TOTAL
	f	f	f	f	f	
30-35	2 (1.8)	5 (1.8)	0 (1.8)	1 (1.8)	1 (1.8)	**9**
24-29	19 (1.4)	25 (1.4)	5 (1.4)	11 (1.4)	10 (1.4)	**70**
	22	15	20	14	20	

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18-23	(18.2)	(18.2)	(18.2)	(18.2)	(18.2)	**91**
12-17	7 (13.4)	3 (13.4)	25 (13.4)	16 (13.4)	16 (13.4)	**67**
6-11	0 (2.6)	2 (2.6)	0 (2.6)	8 (2.6)	3 (2.6)	**13**
TOTAL	**50**	**50**	**50**	**50**	**50**	**250**

Degree of freedom	**16**
Table Value `	**26.30**
Computed Value	**67.9**
α	**.05**
Mean	**20.22**

Difference in performance in the overall scores in algebra of the respondents across colleges, the actual mean obtained by the students is 20.22. The computed chi-square is 67.9 and the table value is 26.31 at level of significance of .05 with a degree of freedom of 16. There is a significance difference in the level of performance in the overall scores in algebra among students across

CONCLUSION

Many practical studies are carried out to investigate the performance of students in Algebra across Colleges. The focus of this research is that student performance exhibited deficiency in identifying, classifying and solving the data given. It is further implied that said students had weak foundation of the subject due to their attitudinal tendencies such as lack of interest and appreciation to the subject. Therefore, mathematics teachers should sensibly select lessons in well-matched to the learning capability/level of the students within their comprehension.

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